Figs.1A to 1C are views showing an arrangement of an electric power unit for electric discharge surface treatment of an embodiment of the present invention and also showing a voltage impressed between electrodes and also showing an electric discharge current;

Figs.2A to 2C are schematic illustrations showing the circumstances of formation of a hard coat on a workpiece by electric discharge surface treatment in which an electric power unit for electric discharge surface treatment of an embodiment of the present invention is used;

Fig.3 is a view showing a comparison of length of consumption of an electrode between a case in which electric discharge treatment is conducted by a conventional power unit for electric discharge surface treatment and a case in which electric discharge treatment is conducted by a power unit for electric discharge surface treatment of the present invention;

Fig.4 is an arrangement view showing an example of a device used for electric discharge surface treatment;

Fig.5 is a view showing a voltage between electrodes and also showing an electric discharge current pulse in a conventional electric power unit for electric discharge surface treatment;

Figs.6A and 6B are schematic illustrations of adhesion of electrode material to a workpiece;

Fig.7 is a view showing a change in the electric current density and also showing a change in the diameter of an electric discharge arc column by the lapse of time from the start of electric discharge; and

Figs.8A and 8B are photographs of a surface of a workpiece of steel in which electric discharge surface treatment is conducted by one shot of electric discharge current pulse.

Best Mode for carrying out the Invention

Figs.1A to 1C are views showing an electric power unit for electric discharge surface treatment of an embodiment of the present invention, wherein Fig.1A is an arrangement view, Fig.1B is a view showing a voltage between electrodes and also showing an electric discharge current, and Fig.1C is a view showing another example of the electric discharge current. In Figs.1A to 1C, reference numeral 1 is an electrode for electric discharge surface treatment, reference numeral 2 is a workpiece, reference numeral 3 is a processing tank, reference numeral 4 is a processing solution, reference numeral 13 is a group of switching elements, reference numeral 14 is a control means for controlling by turning on and off the group of switching elements 13, reference numeral 15 is an electric power unit, reference numeral 16 is a group of resistors, T1 is a

first pulse width, T2 is a second pulse width, Tr is a recess time, IP1 is a first peak value, and Ip2 is a second peak value. The group of switching elements 13, control means 14, electric power unit 15 and group of resistors 16 correspond to an electric power unit for electric discharge surface treatment to determine a wave-form of the electric discharge current pulse in the process of electric discharge surface treatment.

Next, operation will be explained below. The electrode 1 for electric discharge surface treatment and the workpiece 2 are opposed to each other in the processing solution 4, and a predetermined interval is kept between them by a drive unit not shown in the drawing. The peak value of the electric discharge current is a function of the voltage of the electric power unit 15 and the resistance of a resistor in the group of resistors 16 which is connected in series with a switching element, which is turned on, in the group of switching elements 13. When the switching element in the group of switching elements 13, which is connected in series with a resistor in the group of resistors 16 of high resistance, is turned on by the control means 14, a voltage can be impressed between the electrode 1 for electric discharge surface treatment and the workpiece 2. After a predetermined period of time has passed, electric discharge is generated (the first peak